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ELECTRIC SWITCH

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FIG. 1

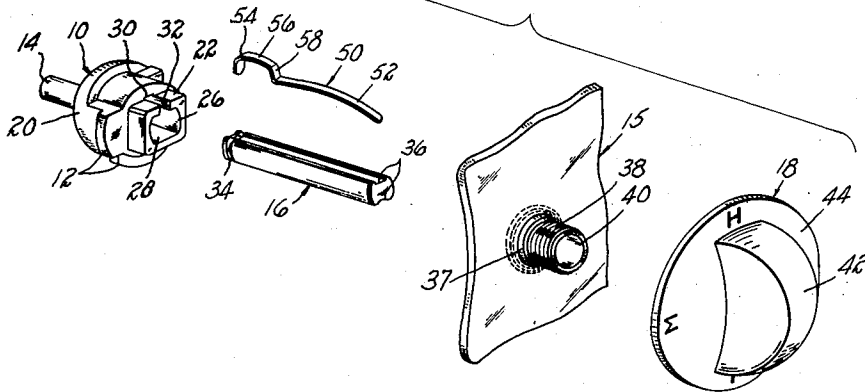
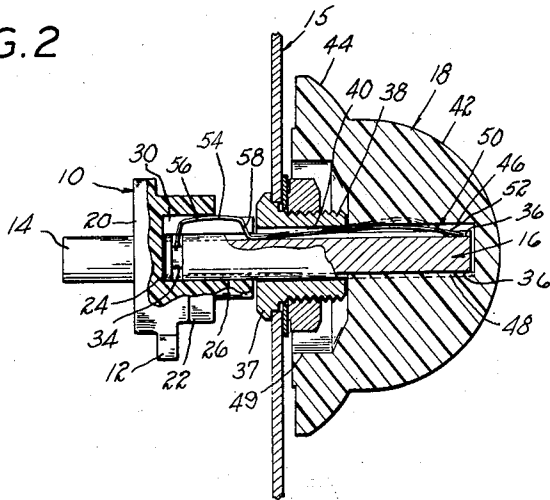


FIG. 2



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ELECTRIC SWITCH

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5 Claims. (Cl. 200—172)

This invention relates generally to improvements in an electric switch and, more specifically, to arrangements for detachably securing a manually operable actuating knob to one end of a switch operating shaft and a switch contact operating member to the other end.

Many conventional circuit control devices have switches which include an operating member generally actuated by a manually operable knob or handle which is easily detachable from a stem or shaft projecting from the operating member, and friction means in the form of a spring or similar element is employed to detachably retain the knob on the operating stem. In such constructions the spring or similar element is somewhat loosely supported either by the stem or within the knob and when the knob is removed from the stem, the spring or other element is frequently dislodged from its operative position and has to be replaced before the knob is restored to operative relation with the switch operating stem.

It is an object of the present invention to provide an improved switch operating assemblage including a manually operable actuating knob and a switch contact operating member, both of which can be frictionally detachably secured to the switch operating shaft.

It is another object of the present invention to provide a switch operating shaft with means for frictionally and detachably retaining a manually operable actuating knob, the assemblage being characterized by its simplicity and compactness and comprising elements which may be economically fabricated and assembled and which, when assembled, cannot be inadvertently disassembled.

A further object of the invention is to provide a switch assembly of such construction that a metallic spindle may be employed as the operating shaft, thereby minimizing any likelihood of breakage. In this connection, it is an aim of the invention to make the operating assembly of several detachable parts having the required overall dielectric properties, yet providing the benefits above mentioned.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawing:

Fig. 1 is an exploded perspective view illustrating the components of a switch operating assemblage constructed in accordance with the present invention; and

Fig. 2 is a sectional view of the elements shown in Fig. 1 in their assembled relation.

It should be understood that the accompanying drawing illustrates a sub-assembly of switch operating elements which may be utilized in connection with a switch assembly such as that illustrated in my copending application Serial No. 145,359 entitled "Electric Switch," filed February 21, 1950, now Patent No. 2,659,792,

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November 17, 1953, and from which the subject matter about to be described is a continuation-in-part.

For purposes of illustration, a switch operating member 10, formed from any suitable material such as, for instance, synthetic resin, is shown having a plurality of radially extending cam surfaces 12 which frictionally engage conventional switch arms within an electric switch casing to move the arms to open and closed positions to effect desired circuit connections. The switch operating member 10 is carried for rotation by a stem or shaft 14 which projects to one side of the operating member 10 and which is journaled in actual use within a switch box or casing (not illustrated). Journaled adjacent the other end in a cover plate 15, which provides one wall of the aforementioned casing, is an operating stem or shaft 16, preferably metallic, detachably connected to the operating member 10 in a manner presently to be described. The shaft or spindle, in turn, is rotated by a manually operable actuating knob 18 disposed externally of the cover plate 15 and detachably secured to the shaft 16 in a manner also described in greater detail hereinafter.

The switch operating member 10 is provided with a hub portion 20 and a boss 22 which projects toward the cover plate 15, the hub portion containing a recess 24 therein for the accommodation of one end of the shaft 16 and the boss having an axial passage 26 communicating therewith through which the shaft end passes in order to abut the bottom of the recess 24. As best viewed in Fig. 1, the recess and passage are non-circular, being provided with a flat side at 28 which prevents relative turning of the member 10 and the shaft 16. The sidewall of the recess 24 opposite the flat side 28 is channeled or grooved at 30 for the reception of one end of a leaf spring yet to be described, whereas the corresponding side of the passage 26 is slotted at 32 to permit facile introduction of said spring end to the groove 30.

Provided in the end of the shaft 16 which is to be received in the member 10 is a peripheral groove 34 for the purpose of detachably anchoring one end of the above alluded to leaf spring which will hereinafter be referred to in detail. In addition, the shaft is provided with a pair of oppositely disposed, longitudinal grooves 36 to be described.

The cover plate 15 is formed from suitable sheet material and is apertured to receive a flanged bushing 37 equipped with a centrally disposed, outwardly extending boss 38 which is externally threaded and which has a central bore 40 for receiving and journaling the operating shaft 16 intermediate the ends thereof. The external thread is provided on the cover plate boss so that the switch casing may be secured behind a wall or panel which has a suitably threaded aperture so that the only visible element of the switch mechanism is the actuating knob 18.

The manually operable knob 18 may be formed from the same material as the member 10 and is provided with a finger gripping portion 42 and a face plate 44. The knob 18 defines a shaft receiving recess 46 for accommodating that end portion of the shaft 16 which projects outwardly from the cover plate 15. The recess 46 may contain a rib 48 or other suitable means for interengaging one of the grooves 36 in the shaft to prevent relative rotation between the knob and the shaft, or the recess may have one side flattened as in the case of the flat side 28 within the recess 24 of the member 10. Preferably, the knob also defines a cavity 49 in the face plate 44 to accommodate the extending threaded boss 38 of the cover plate.

The knob 18 is assembled to the operating shaft 16 by moving the shaft longitudinally into the recess 46 with the rib 48 and one shaft groove 36 aligned. Means are

provided for frictionally retaining the knob in the assembled operative position upon the shaft and such means comprises a spring 50 longitudinally supported on the shaft 16. The spring 50 is longitudinally curved adjacent the free end 52 thereof to effect a secure frictional engagement with the wall of the knob recess 46. When the knob is removed from the shaft 16, the curved portion of the spring 50 will be spaced from the stem as clearly shown in Fig. 1 and as also shown in broken lines in Fig. 2. When compressed into frictional engagement with the walls of the recess 46 in the knob, the spring will be partially disposed within one of the grooves 36 in the shaft 16.

The other end of the spring 50 is offset to form what may best be described as an inverted U-shaped portion 54, appearing as such in Fig. 2, the free extremity of which is substantially perpendicular to the axis of the shaft 16 and engageable in the peripheral groove 34 to anchor said spring against longitudinal dislocation. The bridging or bight section of the portion 54, it will be noted, is slightly inclined and in this way serves as a resilient cam face 56 for engagement with the roof of the groove 30 of the recess 24, the slot 32 permitting ready entrance of the bight 54 into the groove for this expressed purpose. Such frictional or pressural engagement of the bight 54 with the channel or grooves 30 will retain the spring operatively assembled with the operating member 10 prior to the attachment of the knob 18 to the shaft 16.

Intermediate the ends of the spring, the same is bent to provide a laterally extending portion 58 which overlies the inner surface of the cover 15 as shown in Figure 2. Thus, when the cover 15 has been assembled with the switch casing so as to hold the operating member 10 in operative position within the casing, the lateral portion 58 of the spring 50 will engage the inner surface of the cover and, aided by the reactive engagement of the spring with the peripheral groove 34, will preclude either outward movement of the spring relative to the shaft 16 or outward movement of the shaft relative to the cover. The aforesaid engagement of the spring extremity in the groove 34 of course prevents inward movement of the spring during assembly or disassembly of the knob.

It will be seen from the foregoing that the present invention provides an extremely simple, durable and inexpensive assemblage for retaining an actuating knob on a switch operating shaft and which, by its construction, permits removal of the knob without thereby causing dislodging or disassembly of the retaining means. Somewhat similarly, provision is made for detaching the switch contact actuating member without difficulty whenever desired. Stated otherwise, the assemblage constituting the member 10, the shaft 16, the knob 18, and the spring 50 may be conveniently assembled without the use of tools or other implements and may be just as readily completely disassembled.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In an electric switch having a switch operating member provided with a recess and surrounded by a casing having an opening opposite the recess, the combination of a switch operating spindle projecting through said opening and having one end disposed in said recess, one wall of said recess having a longitudinal groove parallel to said spindle, said spindle having a longitudinal channel

and a transverse groove adjacent said one end, a leaf spring supported in said channel extending through said opening, said spring having an inturned portion at one end in engagement with said transverse groove to prevent relative longitudinal movement of said spring and spindle, a transversely extending U-shaped portion on said spring in frictional engagement with said longitudinal groove and engageable with the inner side of said casing to prevent withdrawal of said spindle therefrom, a longitudinally extending outwardly convex bow in said spring at its other end, and a knob having a recess embracing the other end of said spindle and frictionally engaging said bow to retain the knob on the spindle.

2. In an electric switch having a casing and a switch operating member provided with a shaft projecting through an aperture in one wall of said casing and movable relative thereto, the combination comprising a knob having a shaft receiving recess and which is detachably mounted on the outer end of said shaft, means on said operating member defining a recess extending thereinto adjacent and parallel to said shaft, a spring carried by said shaft extending through said aperture and frictionally engaging a wall of the recess in said knob to detachably retain said knob on said shaft, the other end of said spring having a transversely offset portion disposed within said recess and frictionally engaged with said operating member to retain said operating member on said shaft, the connected end of said offset portion residing intermediate the ends of said spring and arranged to overlie the inner surface of said casing wall adjacent the aperture therein to prevent longitudinal movement of said spring along said shaft when said knob is moved thereon or withdrawn therefrom, and interengaging means on said knob and shaft to prevent relative rotation of said knob about said shaft.

3. In an electric switch having a casing and a switch operating spindle projecting through an aperture in one wall of said casing and movable relative thereto, the combination including said spindle, the spindle having a transverse groove adjacent its inner end, a knob having a spindle receiving recess and which is detachably mounted on the outer end of said spindle, a spring carried by said spindle extending through said aperture and frictionally engageable with said knob to detachably retain said knob in one axial position on said spindle, said spring having a U-shaped offset portion overlying the inner surface of said casing wall and operable to prevent movement of said spring longitudinally outwardly of said spindle when said knob is withdrawn therefrom, an inturned end portion on said spring engageable with said transverse groove to prevent relative longitudinal movement of said spindle and spring, and a switch contact operating member received on the inner end of said spindle, said operating member frictionally engaging the offset portion of said spring.

4. In an electric switch having a casing and a switch operating shaft projecting through an aperture in one wall of said casing and movable relative thereto, the combination including said shaft, a knob having a shaft receiving recess and which is detachably mounted on the outer end of said shaft, interengaging means on said knob and shaft to prevent relative rotation thereof, a spring carried by said shaft and frictionally engageable with said knob to detachably retain said knob in one axial position on said shaft, said spring having a U-shaped offset portion overlying the inner surface of said casing wall and operable to prevent movement of said spring longitudinally outwardly of said shaft when said knob is withdrawn therefrom, one end of the shaft having a transverse groove into which the free end of said offset portion engages at substantially right angles to the axis of the shaft to anchor said spring to the shaft, and a switch contact operating member having a shaft receiving recess embracing the inner end of said shaft and frictionally engaging the offset portion of said spring to detachably retain said

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switch contact operating member in one axial position on said shaft.

5. In an electric switch having a casing and a switch operating spindle projecting through an aperture in one wall of said casing and movable relative thereto, the combination including said spindle, the spindle being provided with a transverse groove near one end, a spring carried by said spindle and having a hooked end in engagement with said groove to prevent relative longitudinal movement of said spring and spindle, a switch contact member having a recess embracing the grooved end of said spindle and having frictional engagement with a por-

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tion of the hooked end of said spring to removably retain said member in operative position on said spindle, and a knob at the other end of said spindle, said knob being recessed and frictionally engaging said spring to removably retain said knob on said other end of the spindle.

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